

Amendments to the Claims

1. – 46. (Canceled)

47. (Currently Amended) An isolated polypeptide comprising at least 90% sequence identity to the amino acid sequence of SEQ ID NO: 30, wherein the polypeptide can convert alpha-alanine to beta-alanine in a cell alanine 2,3 aminomutase activity.

48. (Original) The polypeptide of claim 47, wherein the polypeptide comprises a mutated lysine 2,3-aminomutase amino acid sequence.

49. (Original) The polypeptide of claim 48, wherein the mutated lysine 2,3-aminomutase amino acid sequence is a mutated *Bacillus subtilis*, *Deinococcus radiodurans*, *Clostridium subterminale*, *Porphyromonas gingivalis* or *Escherichia coli* lysine 2,3-aminomutase.

50. (Original) The polypeptide of claim 49, wherein the mutated lysine 2,3-aminomutase amino acid sequence is a mutated *Bacillus subtilis* or mutated *Porphyromonas gingivalis* lysine 2,3-aminomutase.

51. (Currently Amended) The polypeptide of claim 47, wherein the An isolated polypeptide comprising comprises amino acids 50-390 of a sequence shown in SEQ ID NO: 21 or amino acids 15-390 of a sequence shown in SEQ ID NO: 30, wherein the polypeptide can convert alpha-alanine to beta-alanine in a cell.

52. (Canceled)

53. (Currently Amended) The polypeptide of claim [[52]]47, wherein the polypeptide comprises a sequence having at least 95% sequence identity to SEQ ID NO: 21 or 30 and can convert alpha-alanine to beta-alanine in a cell.

54. (Currently Amended) The polypeptide of claim [[52]]47, wherein the polypeptide

comprises SEQ ID NO: 21-~~or~~ 30.

55. (Currently Amended) The polypeptide of claim [[52]]47, wherein the polypeptide comprises one or more conservative amino acid substitutions.

56. (Currently Amended) The polypeptide of claim [[52]]47, wherein the polypeptide comprises no more than 10 conservative amino acid substitutions.

57. (Original) An isolated nucleic acid comprising a nucleic acid sequence that encodes the polypeptide of claim 47.

58. (Original) The isolated nucleic acid of claim 57 operably linked to a promoter sequence.

59. (Currently Amended) The isolated nucleic acid of claim 57, wherein the nucleic acid comprises ~~nucleotides 307-1017 of SEQ ID NO: 20 or~~ nucleotides 55-1026 of SEQ ID NO: 29.

60. (Currently Amended) The isolated nucleic acid of claim 57, wherein the nucleic acid comprises a sequence having at least 90% identity to ~~SEQ ID NO: 20 or~~ SEQ ID NO: 29.

61. (Currently Amended) The isolated nucleic acid of claim 57, wherein the nucleic acid comprises a sequence having at least 95% identity to ~~SEQ ID NO: 20 or~~ SEQ ID NO: 29.

62. (Original) The isolated nucleic acid of claim 60, wherein the nucleic acid sequence includes one or more substitutions which results in one or more conservative amino acid substitutions.

63. (Original) The isolated nucleic acid of claim 60, wherein the nucleic acid sequence includes one or more substitutions which results in no more than 10 conservative amino acid substitutions.

64. (Currently Amended) The isolated nucleic acid of claim 61, wherein the nucleic acid comprises SEQ ID NO: 20 ~~or~~ 29.

65. (Original) A vector comprising the isolated nucleic acid of claim 57.

66. (Original) A recombinant nucleic acid comprising the isolated nucleic acid of claim 57.

67. (Original) A cell transformed with the recombinant nucleic acid of claim 66.

68. (Canceled)

69. (Original) A transformed cell comprising at least one exogenous nucleic acid molecule, wherein the at least one exogenous nucleic acid molecule comprises a nucleic acid sequence that encodes the polypeptide of claim 47.

70. (Original) The transformed cell of claim 69, wherein the cell produces beta-alanine from alpha-alanine.

71. (Currently amended) The cell of claim 70, wherein the cell produces 3-HP, and comprises:

beta alanine;

an enzyme comprising CoA transferase activity, thereby producing beta-alanyl-CoA from the beta-alanine;

an enzyme comprising beta-alanyl-CoA ammonia lyase activity, thereby producing acrylyl-CoA from the beta-alanyl-CoA;

an enzyme comprising 3-HP-CoA dehydratase activity, thereby producing 3-HP-CoA from the alanyl-CoA; and

an enzyme comprising CoA transferase activity, 3-HP-CoA hydrolase activity, and/or 3-hydroxyisobutryl CoA hydroase activity, to produce 3-HP from 3-HP-CoA.

72. (Currently amended) The cell of claim 71, wherein the cell produces 1,3-propanediol and comprises:

acetylating aldehyde:NAD(+) oxidoreductase activity and alcohol:NAD(+) oxidoreductase activity, thereby producing 1,3-propanediol from the 3-HP.

73. (Currently amended) The cell of claim 70, wherein the cell produces pantothenate and comprises:

beta alanine; and

alpha-ketopantoate hydroxymethyltransferase activity, alpha-ketopantoate reductase activity, and pantothenate synthase activity, thereby producing pantothenate from the beta-alanine.

74. (Currently amended) The cell of claim 73, wherein the cell produces CoA and comprises:

pantothenate; and

pantothenate kinase activity, 4'-phosphopantethenoyl-1-cysteine synthetase activity, 4'-phosphopantothenoylcysteine decarboxylase activity, ATP:4'-phosphopantetheine adenyltransferase activity, and dephospho-CoA kinase activity, thereby producing CoA from the pantothenate.

75. (Canceled)

76. (Original) A method of producing a polypeptide comprising alanine 2,3-aminomutase activity, comprising culturing the cell of claim 67 under conditions that allow the cell to produce the polypeptide comprising alanine 2,3-aminomutase activity.

77. – 106. (Canceled)

107. (Previously Presented) A transgenic plant comprising the recombinant nucleic acid of claim 57.

108. (new) The cell of claim 70, wherein the cell produces 3-HP and comprises:

beta alanine;
an enzyme comprising 4-aminobutyrate aminotransferase activity and/or beta-alanine-2-oxoglutarate aminotransferase activity, thereby producing malonic semialdehyde from the beta-alanine; and
an enzyme comprising 3-HP dehydrogenase activity and/or 3-hydroxyisobutyrate dehydrogenase activity, thereby producing 3-HP from the malonic semialdehyde.

109. (new) The cell of claim 71, wherein the cell produces 1,3-propanediol and comprises:

an enzyme comprising acetylating aldehyde dehydrogenase (NAD(P)+) activity and an enzyme comprising alcohol dehydrogenase activity, thereby producing 1,3-propanediol from the 3-HP.

110. (new) The cell of claim 71, wherein the cell produces a 3-HP ester and comprises:

lipase activity or esterase activity, thereby producing 3-HP ester from the 3-HP.

111. (new) The cell of claim 71, wherein the cell produces polymerized 3-HP and comprises:

poly hydroxyacid synthase activity, thereby producing polymerized 3-HP from the 3-HP.

112. (New) The isolated polypeptide of claim 47, wherein the polypeptide comprises a Gly, Gln, Thr, Asn, or His at position 331 of SEQ ID NO: 30.

113. (New) The polypeptide of claim 47, wherein the polypeptide comprises a sequence having at least 97% sequence identity to SEQ ID NO: 30 and can convert alpha-alanine to beta-alanine in a cell.

114. (New) The polypeptide of claim 47, wherein the polypeptide comprises a sequence having at least 98% sequence identity to SEQ ID NO: 30 and can convert alpha-alanine to beta-alanine in a cell.

115. (New) The polypeptide of claim 47, wherein the polypeptide comprises a sequence having at least 99% sequence identity to SEQ ID NO: 30 and can convert alpha-alanine to beta-alanine in a cell.

116. (New) The isolated nucleic acid of claim 57, wherein the nucleic acid comprises a sequence having at least 97% identity to SEQ ID NO: 29.

117. (New) The isolated nucleic acid of claim 57, wherein the nucleic acid comprises a sequence having at least 98% identity to SEQ ID NO: 29.

118. (New) The isolated nucleic acid of claim 57, wherein the nucleic acid comprises a sequence having at least 99% identity to SEQ ID NO: 29.